

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on May 14, 2003, and the references cited therewith.

Claim 57 is amended, no claims are canceled, and no claims are added; as a result, claims 46, 47, and 57-82 are now pending in this application.

Double Patenting Rejection

Claims 58-59 were provisionally rejected under the judicially created doctrine of double patenting over claim 58 of co-pending Application No. 09/941,125 (Published as Patent Application Publication No. US 2002/0000662).

Applicant respectfully traverses the double patenting rejection. The reference used for the double patenting rejection (Application No. 09/941,125) is a family member application along with the present application, both as divisional filings under 37 CFR 1.53(b) from parent application 09/489,187, now US Pat. No. 6,284,316. A restriction requirement in the parent application divided the claims into five **distinct inventions**. A copy of the restriction requirement is attached for your review. Applicant therefore submits that a restriction requirement is improper under 35 USC §121, MPEP §804.01. Reconsideration and withdrawal of the double patenting rejection is respectfully requested.

§103 Rejection of the Claims

Claim 57 was rejected under 35 USC § 103(a) as being unpatentable over Xing et al. (U.S. Patent No. 6,153,490) in view of Ikeda et al. (U.S. Patent No. 5,239,196).

The rejection states that Xing teaches "a contact having a titanium alloy layer 908 (cf. col. 10, l. 5) formed overlaying walls of a contact hole 904/906/908 (cf. col. 9, l. 59) formed overlying an exposed silicon base layer 904 (cf. col. 10, l. 4) of the contact hole the titanium silicide layer 906 being directly coupled to the titanium alloy layer 908."

Xing appears to show a silicide layer 906 coupled to a polysilicon plug 904, however, Xing does not show, teach or suggest a silicide layer 906 directly coupled to an exposed **crystalline** silicon base layer.

In contrast, claim 57 includes a contact having a titanium alloy layer formed overlying walls of a contact hole and a titanium silicide layer formed overlying an exposed crystalline silicon base layer of the contact hole. Because the cited references, either alone or in combination, do not show every element of Applicant's independent claims, a 35 USC § 103(a) rejection is not supported by the references. Reconsideration and withdrawal of the rejection is respectfully requested with respect to Applicant's claim 57.

Claims 58-59 were rejected under 35 USC § 103(a) as being unpatentable over Ikeda et al. in view of Xu et al. (U.S. Patent No. 6,217,721).

The rejection states that Xu et al teach that not separate siliciding step is required for inter-level vias, provided one chooses to use aluminum for the fill 334 (cf. col. 26, l. 27-28), requiring only modest heating to about 400 degrees centigrade (cf. col. 26, l. 9-11).

Xu appears to show a $TiAl_3$ alloy as noted by the Examiner at column 26, lines 9-11. Additionally, Figures 16 and 17 and the related specification of Xu appear to describe a via structure located over a "patterned intermediate metal layer 310" (metal-1) "for example aluminum." However, the replacement for the separate siliciding step appears to refer to only the *bottom* of the contact hole where the titanium 160 of the liner 150 is in direct contact with the metal layer 310.

There is no teaching in Xu that the fill 334 consumes portions of the liner 150 to form a titanium alloy layer formed overlying **walls** of the contact hole. In fact, column 13, line 65 – column 14, line 2 of Xu teach that one purpose of the TiN layer 162 as part of the liner 150 is prevent aluminum from migrating through.

In contrast, Applicant's claim 58 includes a **titanium alloy layer formed overlying walls** and an exposed base layer of a contact hole. Because the cited references, either alone or in combination, do not show every element of Applicant's independent claims, a 35 USC § 103(a) rejection is not supported by the references. Reconsideration and withdrawal of the rejection is respectfully requested with respect to Applicant's claim 58.

Regarding claim 59, Applicant respectfully submits that the claim, pursuant to arguments presented above, is in condition for allowance over Ikeda in view of Xu. As discussed above, a

separate layer in Xu that is located overlying walls of the contact opening appears to be pure titanium 160, not a titanium alloy. Ikeda also does not teach a titanium alloy layer overlying walls of a contact hole.

Because the cited references, either alone or in combination, do not show every element of Applicant's independent claims, a 35 USC § 103(a) rejection is not supported by the references. Reconsideration and withdrawal of the rejection is respectfully requested with respect to Applicant's claim 59.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney ((612) 373-6944) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743

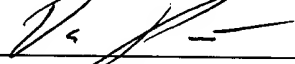
Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, P.O.Box 1450, Alexandria, VA 22313-1450, on this 7th day of August, 2003.

Amy Moriarty
Name


Signature